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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/707,405

12/11/2003

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EXAMINER

SONG, HOON K

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/707,405	<b>Applicant(s)</b> JIANG ET AL.	
	<b>Examiner</b> Hoon Song	<b>Art Unit</b> 2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 19 March 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1,3,4,13-15,17-22 and 24-52 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 36 is/are allowed.
- 6) ☒ Claim(s) 1,3,4,13-15,17-22,24-28,34,35 and 37-52 is/are rejected.
- 7) ☒ Claim(s) 29-33 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3, 4, 13-14 and 41-42 are rejected under 35 U.S.C. 102(e) as being anticipated by Tsunota et al. (US 2003/0178570A1).

Regarding claim 1, Tsunota teaches a CT detector comprising:

a scintillator array having a plurality of scintillators (130) and

a reflector (540) interstitially disposed between at least two adjacent scintillators, the reflector including a light absorption element (550) disposed between a pair of reflective elements (paragraph 6) and

a reflective layer (540) coated to a top of the scintillator array (figure 6).

Regarding claim 3, Tsunota teaches the light absorption element is configured to reduce optical cross-talk between the at least two adjacent scintillators (paragraph 5).

Regarding claim 4, Tsunota teaches the light absorption element is configured to substantially eliminate optical cross-talk between the at least two adjacent scintillators (paragraph 6).

Regarding claim 13, Tsunota teaches the detector incorporated into a CT imaging system (paragraph 2).

Regarding claim 14, Tsunota teaches the CT imaging system is configured to acquire radiographic data of a medical patient (paragraph 2).

Regarding claims 41 and 42, Tsunota teaches a CT detector comprising:

A scintillator array having a plurality of scintillators (2);

A reflector top coat cast on an x-ray receptor surface of each of the plurality of scintillators and

A reflector (4) interstitially disposed between at least two adjacent scintillators, the reflector including a light absorption element disposed between a pair of reflective elements, wherein the pair of reflective elements includes  $\text{TiO}_2$  (paragraph 7).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 15, 17-22, 24-35, 37-40 and 43-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsunota in view of Venkataramani et al. (US 2002/0181647A1).

Regarding claims 15, 34 and 37, Tsunota teaches a CT system and method comprising:

a CT system (figure 8);  
a scintillator array having a plurality of scintillators (130); and  
a reflector (540) interstitially disposed between at least two adjacent scintillators (130), the reflector including a light absorption element (550) disposed between a pair of reflective elements, wherein the light absorption element is configured to absorb x-rays, reduce x-ray punch through wherein, the light absorption element includes a high atomic number metal composite (paragraph 6).

However fails to teach the light absorption element is a light absorption composite element nor the composite layer includes a high-Z metal and a low-viscosity polymer.

Venkataramani teaches an x-ray absorbing layer made of composite material including a polymer organic with high density particles embedded within the organic binder (paragraph 29).

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the absorption element of Tsunota with the composite material as taught by Venkataramani, since the composite material would protect the scintillators while providing good x-ray absorbing properties.

Regarding claim 17, Venkataramani teaches the high Z-metal includes one of tungsten and tantalum (paragraph 0029).

Regarding claim 18, Venkataramani teaches the low-viscosity polymer has a non-translucent color (paragraph 0029).

Regarding claim 19, Tsunota teaches the at least a pair of reflective layers includes TiO<sub>2</sub>.

Regarding claims 20 and 43, Tsunota teaches each reflective layer has a lateral thickness of approximately 15-90 micrometer and the composite layer has a lateral thickness of approximately 50-100 micrometer.

Regarding claim 21, Tsunota teaches the reflector assembly is cast between adjacent scintillators.

Regarding claim 49, Venkataramani teaches the composite layer is an optical light absorber (paragraph 0029).

Regarding claim 38, Venkataramani teaches the metal composite includes a cured metal powder and low viscosity polymer combination (paragraph 0029).

Regarding claim 39, 50, Venkataramani teaches the composite layer further comprises a low viscosity polyurethane (paragraph 0029).

Regarding claims 44, 51, Venkataramani teaches the low viscosity polymer is one of epoxy and polyurethane (paragraph 0029).

Regarding claim 49, Venkataramani teaches the high-Z metal comprises one of tungsten and tantalum (paragraph 0029).

Regarding claim 22, Tsunota teaches a method of CT detector manufacturing comprising the steps of:

providing a scintillator array (130) of a plurality of scintillators, wherein the step of providing a scintillator array includes the step of forming a substrate of scintillation material;

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disposing a reflective layer (540) between adjacent scintillators;

disposing a reflective layer (540) directly on an x-ray receptor surface of the scintillator array (130); and

disposing a light absorbing composite layer (550) between the reflective layers that are disposed between adjacent scintillators.

However fails to teach the layer is composite layer.

Venkataramani teaches an x-ray absorbing layer made of composite material (paragraph 29).

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the absorption element of Tsunota with the composite material as taught by Venkataramani, since the composite material would protect the scintillators while providing good x-ray absorbing properties (paragraph 29).

Regarding claim 24, Tsunota teaches pixelating the substrate (figure 7).

Regarding claim 25, Tsunota teaches the step of pixelating includes at least one of chemically and mechanically forming gaps in the substrate to define a plurality of scintillators (figure 7).

Regarding claim 26, Tsunota teaches mechanically forming gaps includes dicing the substrate (figure 7).

Regarding claim 27, Tsunota teaches depositing reflective material into at least the gaps (figure 7).

Regarding claim 28, Tsunota teaches depositing includes the step of casting (figure 7).

Regarding claim 35, Tsunota teaches the claimed invention except for the light absorption element is configured to absorb approximately 50% of the x-ray. It would have been obvious to one having ordinary skill in the art at the time the invention was made to configure to absorb 50% of x-ray, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. Accordingly, one having ordinary skill in the art would be motivated to adapt the claimed absorption since it would further improve the cross-talk between the scintillator pixels.

***Allowable Subject Matter***

Claim 36 is allowed over prior art.

Claims 29-33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 36, the prior art fails to teach a CT detector having a reflector interstitially disposed at least two adjacent scintillators, the reflector includes a light absorption element disposed between a pair of reflective elements wherein the light absorption element extends in length to an upper surface of the reflective top coat and wherein the light absorption element is configured to reduce x-ray punch through as claimed in independent claim 36.



Regarding claims 29-33, the prior art fails to teach disposing a composite layer in the reflective layer includes the step of creating channels in the reflective material as claimed in claim 29.

### ***Response to Arguments***

Applicant's arguments filed 3/19/2007 have been fully considered but they are not persuasive.

The applicant argues that Tsunota et al. (US 2003/0178570) fails to teach a light absorption element, a light absorbing composite layer or a light absorption layer. The examiner disagrees.

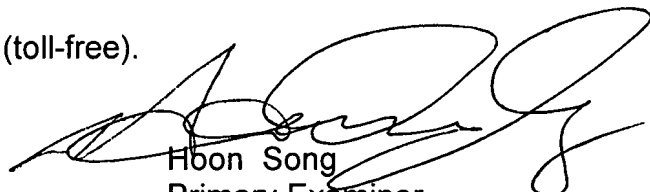
Tsunota teaches that the radiation detector 600 illustrated in FIG. 6 is generally referred to as a multi-array, in which scintillators 430 are arranged in a grid pattern, and which structure is such that there are radiation shielding plates 550 within the portion, interposed between the scintillators 430, of a light reflecting material 640 (paragraph [0005]). Tsunota further teaches the radiation shielding plates 550 is made of heavy metals such as Mo, W, P, and the like, can be provided between the scintillators to prevent the passage of the radiation between the scintillators (paragraph [0006]). One having ordinary skill in the art would consider a heavy material such as Mo, W or P as an x-ray absorbing material. Accordingly, the shielding plate 550, made of Mo, W or P preventing the radiation passage between the scintillators is considered absorption layer and the applicant's argument is not persuasive.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoon Song whose telephone number is (571) 272-2494. The examiner can normally be reached on 9:30 AM - 7 PM, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Glick can be reached on (571) 272 - 2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Hoon Song  
Primary Examiner  
Art Unit 2882

HKS